Rain Barrel Manufacturer

Performance Task

Introduction

Rainwater harvesting refers to the collection and storage of rain. This water can be stored and used to water plants, flowers, lawns and wash cars. This rainwater would typically be washed away into a sewer. By collecting this water, it can help conserve water and lower household water bills, as well as reduce stormwater runoff pollution. Many people are also looking at using this rainwater as a potable water source. These ideas are important for you to consider as you design your rain barrel. Your barrel does not need to meet every want, but it should be convenient, and provide water that is safe for a number of uses.

Big Idea / Essential Questions

Big Idea

- The health of all living things is directly related to the quality of the environment.
- People acting individually and/or as groups influence the environment.
- Solid, liquid and gaseous earth materials all circulate in large scale systems at a variety of time scales, giving rise to landscapes, the rock cycle, ocean currents, weather, and climate.
- Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.

Essential Questions

- How does the quality of the environment affect the health of all living things within it?
- How do humans influence the environment?
- What causes the variations in Earth materials, including rain, at different places on Earth?
- How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?

G.R.A.S.P.

Goal

As a small business specializing in green initiatives, you have had many customers visiting your business and inquiring about rain barrels. Your business has decided to manufacture your own rain barrels. These barrels will need to be environmentally safe, and constructed of a material that does not contaminate the water. The barrels should use unique designs to attract interest, resulting in people purchasing them for use at their homes. Additionally, consider modifications that can make the rain barrels more

valuable and purposeful.

Role

As the owner of a small business, you have decided to begin manufacturing unique rain barrels based upon the feedback that you have received from customers. You will need to sell a number of rain barrels to make back your financial investment. Your rain barrels should be unique and help people harvest rainwater in a clean, efficient manner.

Audience

Your audience will be retailers attending a national conference. These individuals will be looking for new products to sell to customers. Your design and presentation could provide a national market for you to sell your unique rain barrels.

Situation

Rainwater harvesting refers to the collection and storage of rain. This water can be stored and used to water plants, flowers, lawns and wash cars. This rainwater would typically be washed away into a sewer. By collecting this water, it can help conserve water and lower household water bills, as well as reduce stormwater runoff pollution. Many people are also looking at using this rainwater as a potable water source. These ideas are important for you to consider as you design your rain barrel. Your barrel does not need to meet every want, but it should be convenient, and provide water that is safe for a number of uses.

Products

1. Technical Report

Based on the location where the rain barrels will be sold, create a technical report detailing the water cycle and the weather patterns that impact rainfall in the region the rain barrel is to be sold. Within your report, include a visual model to describe the cycling of water through Earthâ€™s systems driven by energy from the sun and the force of gravity.

Discuss the potential impact brought on by drought and how fresh water can be a concern for communities and human society in a national and global context.

- What rain barrels are currently on the market?
- What do they have in common and how do they differ?
- How much water can the rain barrel hold based on its shape?

Technical Report - Rain Barrel Manufacturer

Achievement Levels	1	2	3	4
Conventions	Minimal control of sentence formation. Many sentences are awkward and fragmented. Many errors may be present in	Limited and/or inconsistent control of sentence formation. Some sentences may be awkward or fragmented. Many errors may be	Adequate control of sentence formation. Some errors may be present in grammar, usage, spelling	Thorough control of sentence formation. Few errors, if any, are present in grammar, usage,

Achievement Levels	1	2	3	4
(x1)	grammar, usage, spelling, and punctuation, and many of those errors may interfere with meaning.	present in grammar, usage, spelling, and punctuation, and some of those errors may interfere with meaning.	and punctuation, but few, if any, of the errors that are present may interfere with meaning.	spelling, and punctuation, but the errors that are present do not interfere with meaning.
Organization (x1)	The report is unorganized and does not connect the data and the narrative.	The report is somewhat organized and with minimal connections between the data and the narrative.	The report is organized and somewhat connects the data and the narrative.	The report is well organized and strongly connects the data and the narrative.
The Water Cycle (x1)	Presentation lacks detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses minimal detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses adequate detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses thorough detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.
Communities and Natural Resources (x1)	Report lacks a connection between a community's access to natural resources with its ability to provide and sustain the needs of the individuals within that community.	Report minimally connects a community's access to natural resources with its ability to provide and sustain the needs of the individuals within that community.	Report adequately connects a community's access to natural resources with its ability to provide and sustain the needs of the individuals within that community.	Report strongly connects a community's access to natural resources with its ability to provide and sustain the needs of the individuals within that community.
Research (x1)	Product demonstrates a lack of research conducted around the topic.	Product demonstrates that some research was conducted around the topic.	Product demonstrates that research was conducted around the topic using few credible or appropriate sources.	Product demonstrates that thorough research was conducted around the topic, using several sources that are credible and appropriate.
Humans and Earth Systems (x1)	Presentation demonstrates minimal understanding of how humans can influence the environment or water conservation.	Presentation demonstrates minimal understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.	Presentation demonstrates sufficient understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.	Presentation demonstrates strong understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.
Movement of Water (x1)	The product minimally describes the cycling of water through Earthâ€™s systems driven by energy from the sun and the force of gravity.	The product somewhat describes the cycling of water through Earthâ€™s systems driven by energy from the sun and the force of gravity.	The product includes an adequate model to describe the cycling of water through Earthâ€™s systems driven by energy from the sun and the force of gravity.	The product includes a thorough model to describe the cycling of water through Earthâ€™s systems driven by energy from the sun and the force of gravity.

2. Chart or Graph

Research the rainfall of an area for each month for the last 3 years. Use this data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions based upon the location selected.

Show these data as a monthly line graph using each year as a different line. Find the mean, median, and mode of each year, and all three years combined, and explain any differences in the statistics. Make a recommendation as to the size of the rain barrel that should be used in this location based on the rainfall data.

- Where will your rain barrels be sold?
- What is the typical rainfall data for that area?
- How can statistics help you make decisions about the size of your rain barrel for that area?

Chart or Graph - Rain Barrel Manufacturer

Achievement Levels	1	2	3	4
Graphic Reprentation (x1)	Graphic representation is not appropriate based on the type of data collected.	Graphic representation is appropriate based on the type of data collected and contains some required labels/elements.	Graphic representation is appropriate based on the type of data collected and contains most required labels/elements.	Graphic representation is neat, appropriate based on the type of data collected, and contains all required labels/elements.
Research (x1)	Product demonstrates a lack of research conducted around the topic.	Product demonstrates that some research was conducted around the topic.	Product demonstrates that research was conducted around the topic.	Product demonstrates that thorough research was conducted around the topic.
Measures of Center & Spread (x1)	Product shows few of the correct calculations of the mean, median and mode of each individual year's rainfall and of the total of the 3 year's rainfall.	Product shows some of the correct calculations of the mean, median and mode of each individual year's rainfall and of the total of the 3 year's rainfall.	Product shows most of the correct calculations of the mean, median and mode of each individual year's rainfall and of the total of the 3 year's rainfall.	Product shows thorough and accurate calculations of the mean, median and mode of each individual year's rainfall and of the total of the 3 year's rainfall.
Rain Barrel Recommendation (x1)	Information about shape, volume and yearly rainfall are minimally used to make a rain barrel recommendation for the target audience.	Information about shape, volume and yearly rainfall are partially used to make a rain barrel recommendation for the target audience.	Information about shape, volume and yearly rainfall are sufficiently used to make a rain barrel recommendation for the target audience.	Information about shape, volume and yearly rainfall are expertly used to make a rain barrel recommendation for the target audience.
Comparative Inferences (x1)	Product displays a minimal explanation of any similarities and differences in the measures of center and variability in the rainfall data.	Product displays a partial explanation of any similarities and differences in the measures of center and variability in the rainfall data.	Product displays a moderate explanation of any similarities and differences in the measures of center and variability in the rainfall data.	Product displays a complete explanation of any similarities and differences in the measures of center and variability in the rainfall data.
Data Reinforcing Weather Patterns (x1)	The data collected provides minimal evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides some evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides sufficient evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides strong evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

3. Models

Construct a 3D scale model of your rain barrel including the unique features that make your rain barrel effective and efficient. Be sure to include the aesthetic designs you will use for your rain barrels. The completed design model will be used to excite people so they will order them for their homes.

- How much water can your rain barrel hold based on its shape?
- What materials will your rain barrel be made of?
- What makes your rain barrel design different than ones currently on the market?

Models - Rain Barrel Manufacturer

Achievement Levels	1	2	3	4
Plans (x1)	The diagrams and/or drawing of the model have little connection to scale and dimension. Some parts are labeled correctly.	The diagrams and/or drawing of the model have some sense of scale and dimension. Some parts are labeled correctly.	The diagrams and/or drawing of the model are done with strong consideration for scale and dimensions. Most vital parts of the model are labeled on the representative graphics.	The diagrams and/or drawing of the model are done to scale with the appropriate dimensions. All vital parts of the model are labeled on the representative graphics.

Achievement Levels	1	2	3	4
Model (x1)	The model is a minimally accurate with respect to the plans, diagrams, and/or drawings..	The model is a somewhat accurate reproduction of the plans, diagrams, and/or drawings. It has some detail and some critical components.	The model is a mostly accurate reproduction of the plans, diagrams, and/or drawings. It has attention to detail with some critical aspects in place.	The model is an accurate reproduction of the plans, diagrams, and/or drawings. It has great attention to detail.
Problem Solving (x1)	The model meets few needs and requirements set forth through the guidelines provided. The model accurately represents minimal aspects required.	The model meets the many of needs and requirements set forth through the guidelines provided. The model accurately represents some aspects required and solves those problems brought forth.	The model meets the majority of needs and requirements set forth through the guidelines provided. The model accurately represents most aspects required and solves those problems brought forth.	The model meets the needs and requirements set forth through the guidelines provided. The model accurately represents all aspects required and solves the problems brought forth.
Design Considerations (x1)	Design choices reflect little consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect some consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect adequate consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect thorough consideration of geometric shapes and their volume, target audience and aesthetics.
Mathematical Practices in the Design Process (x1)	The product demonstrates minimal understanding of how mathematics are connected to the design process and real world through little use of mathematical practices and concepts.	The product demonstrates some understanding of how mathematics is connected to the design process and real world through some use of mathematical practices and concepts.	The product demonstrates adequate understanding of how mathematics connects to the design process and real world through the use of mathematical practices and concepts.	The product demonstrates strong understanding of how mathematics is connected to the design process and real world through excellent use of mathematical practices and concepts.
Volume (x1)	Inaccurate calculations and explanation of volume when creating the rain barrel volume.	Partial calculation and explanation of rain barrel volume.	Mostly accurately calculation and explanation of rain barrel volume.	Accurate calculation and explanation of rain barrel volume.
Ratios, Proportions, and Scale (x1)	Product is an inaccurate scale model.	Product is a scale model with the potential to compute some actual dimensions.	Product is an adequate scale model that can be used to compute actual dimensions.	Product is an excellent scale model that can be used to compute actual dimensions.

4. Scale Drawing

Create a scale drawing of the rain barrel that you create. Be sure to provide all dimensions and the volume of the barrel. Also, create a one page bulleted list that details the critical features of your rain barrel design. This one page should provide customers with all the necessary information to make an informed decision regarding the value of rain barrels and why they should purchase this rain barrel.

- What is the actual dimensions and volume of your rain barrel?
- What will your scale be for your drawing?

Graphic/Scientific/Scale Drawi - Rain Barrel Manufacturer

Achievement Levels	1	2	3	4
Labels (x1)	Few items have a label.	Some items that need to be identified have a label.	Most items that need to be identified have a label.	Every item that needs to be identified has a label.
Drawing - details (x1)	The drawing and list provide little information about components of the rain barrel.	The drawing and list are done in a manner that provides some information for the viewer about the components	The drawing and list are done in a manner that provides much of the necessary information for the viewer to understand the critical	The drawing and list are done in a manner that is very detailed and provides all information necessary for the viewer to understand the

Achievement Levels	1	2	3	4
		of the rain barrel.	components of the rain barrel.	critical components of the rain barrel.
Mathematical Practices in the Design Process (x1)	The product demonstrates minimal understanding of how mathematics are connected to the design process and real world through little use of mathematical practices and concepts.	The product demonstrates some understanding of how mathematics is connected to the design process and real world through some use of mathematical practices and concepts.	The product demonstrates adequate understanding of how mathematics connects to the design process and real world through the use of mathematical practices and concepts.	The product demonstrates strong understanding of how mathematics is connected to the design process and real world through excellent use of mathematical practices and concepts.
Geometry and Scale (x1)	Product is an inaccurate scale drawing.	Product is a very basic scale drawing with the potential to compute some actual dimensions.	Product is an adequate scale drawing that can be used to compute actual dimensions.	Product is an excellent scale drawing that can be used to compute actual dimensions.
Volume (x1)	Inaccurate calculations and explanation of volume when creating the rain barrel volume.	Partial calculation and explanation of rain barrel volume.	Mostly accurately calculation and explanation of rain barrel volume.	Accurate calculation and explanation of rain barrel volume.
General Formatting (x1)	Graph paper or a computer graphic tool is used to create the drawing. The drawing's size makes the details difficult to see. The drawing is minimally neat.	Graph paper or a computer graphic tool is used to create the drawing. The drawing's size makes it somewhat readable. Some details are clear and the drawing is to scale.	Graph paper or a computer graphic tool is used to create the drawing. The drawing is large enough that the details are clear. It is mostly neat and to scale.	Graph paper or a computer graphic tool is used to create the drawing. The drawing is large enough for details to be clear. The drawing is neat and to scale.
Design Considerations (x1)	Design choices reflect little consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect some consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect adequate consideration of geometric shapes and their volume, target audience and aesthetics.	Design choices reflect thorough consideration of geometric shapes and their volume, target audience and aesthetics.
Materials and Environment (x1)	Product demonstrates minimal understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates some understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates satisfactory understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates strong understanding of the properties of materials selected as related to the environment they will be utilized used.

5. Oral Presentation

Provide a 3-5 minute oral presentation using your chart and perhaps other multimedia, as needed. Present the audience with an understanding of how the water cycle impacts their location based upon the weather and climate.

Present the data from your research to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions based upon the location selected. Explain why this matters and why it is important.

Be sure to provide an overview of water conservation and the value that rain barrels can bring to homes and communities. Present the unique characteristics of your rain barrel design and why it should be sold in various retail stores.

- What are the dimensions and features of your design?
- How does your rain barrel differ from others on the market?
- Why would your design appeal to new costumers?

Oral Presentation - Rain Barrel Manufacturer

Achievement Levels	1	2	3	4
Focus (x1)	The purpose of the presentation â€“ informational, persuasive, etc. and the area of focus were minimally outlined in the introduction. Very little of the content of the presentation was aligned with the stated goals.	The purpose of the presentation â€“ informational, persuasive, etc. and the area of focus are partially outlined in the introduction. Content of presentation was sometimes aligned with stated goals.	The purpose of the presentation â€“ informational, persuasive, etc., and the area of focus are adequately outlined within the introduction. Content of presentation was mostly aligned with stated goals.	The purpose of the presentation â€“ informational, persuasive, etc. and the area of focus are well-outlined within the introduction. Content of presentation is aligned with stated goals.
The Water Cycle (x1)	Presentation lacks detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses minimal detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses adequate detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.	Presentation uses thorough detail to explain the cycling of water through the region and the geographic and environmental factors that impact this cycle.
Research (x1)	Product demonstrates a lack of research conducted around the topic.	Product demonstrates that some research was conducted around the topic.	Product demonstrates that research was conducted around the topic using few credible or appropriate sources.	Product demonstrates that thorough research was conducted around the topic, using several sources that are credible and appropriate.
Delivery (x1)	Presenter makes eye contact, has good posture and adequate volume throughout little of the presentation.	Presenter makes eye contact, has good posture and adequate volume throughout some of the presentation.	Presenter makes eye contact, has good posture and adequate volume throughout most of the presentation.	Presenter makes eye contact, has good posture and adequate volume throughout the whole presentation.
Humans and Earth Systems (x1)	Presentation demonstrates minimal understanding of how humans can influence the environment or water conservation.	Presentation demonstrates minimal understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.	Presentation demonstrates sufficient understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.	Presentation demonstrates strong understanding of how humans can influence the water cycle through the use of a rain barrel and the importance of water conservation.
Volume (x1)	Inaccurate calculations and explanation of volume when creating the rain barrel volume.	Partial calculation and explanation of rain barrel volume.	Mostly accurately calculation and explanation of rain barrel volume.	Accurate calculation and explanation of rain barrel volume.
Materials and the Environment (x1)	Product demonstrates minimal understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates some understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates satisfactory understanding of the properties of materials selected as related to the environment they will be utilized used.	Product demonstrates strong understanding of the properties of materials selected as related to the environment they will be utilized used.
Data to Support Weather Patterns (x1)	The data collected provides minimal evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides some evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides sufficient evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The data collected provides strong evidence for how the motions and complex interactions of air masses result in changes in weather conditions.